REMARKS

This application has been reviewed in light of the Office Action dated January 15, 2003. Claims 1, 4-6, 10-12, 15, 16, 22-30, 39, 40, 44, and 46-70 are pending in this application, with Claims 30, 46, 48, 50, 53, 57, and 61 having been allowed. Claims 1, 16, 27, 46, 51-54, 66, and 68 are in independent form. Claims 66-70 have been added to provide Applicants with a more complete scope of protection. Claims 1, 10, 11, 16, 27, and 51-54 have been amended to define more clearly what Applicants regard as their invention. Applicants note that the changes to Claim 53 are not believed to affect the allowability of this claim. Favorable reconsideration is requested.

Independent Claims 1, 16, 27, 51, 52, and 54, as well as the corresponding dependent claims, were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, each of these claims included language which stated that a particular element was "arranged between two photoelectric conversion units." This language is allegedly unclear since the size of the circuit and the location of the two photoelectric conversion units have not been described. The Office Action poses the question: "which are the two pixels described in the claim?" (See pages 2-3 of the Office Action).

In response, Applicants have amended these claims to eliminate the references to "two photoelectric conversion units." For example, Claims 1 and 51 now recite that --said scan circuit is arranged between photoelectric conversion units included in a single image pickup element--. An example of a scan circuit would be the vertical shift register 501B shown in Figure 9. (See page 14, lines 9-23 of the specification.) Figure 9

also shows that the vertical shift register 501B has one-pixel circuits 602 formed on both sides of the vertical shift register 501B. That is, the vertical shift register 501B is between one-pixel circuits 602, each of which contains a photoelectric conversion element. (See page 12, lines 24-27, page 11, lines 4-16, and Figure 6.)

The other independent claims rejected under Section 112, second paragraph, were amended similarly. In regard to independent Claim 16, an example of a transfer switch is the column selection switch 506, shown in Figures 7 and 9. (See page 12, lines 17-23.) In regard to independent Claims 27 and 54, an example of a protection circuit is reference numeral 702A shown in Figure 21. (See page 26, lines 21-24.) In regard to independent Claim 52 an example of a vertical scan circuit is reference numeral 501B shown in Figure 9, and an example of a horizontal scan circuit is reference numeral 507B, also shown in Figure 9. (See page 14, lines 14-19.) (It is to be understood, of course, that the scope of each of the claims is not limited to the details of these embodiments, which are referred to only for purposes of illustration.)

Applicants believe that the new claim language is sufficiently definite and respectfully request withdrawal of the Section 112, second paragraph rejections.

Claims 1, 12, 15, and 51 were rejected under 35 U.S.C. § 102(b) as being anticipated by PCT Application WO 99/31874 (Fossum), and Claims 16 and 22 were rejected under Section 102(b) as anticipated by U.S. Patent No. 5,464,984 (Cox et al.). Claims 4-6, 23-26, 55, 59, and 63-65 were rejected under 35 U.S.C. § 103(a) as being unpatentable over various combinations of Fossum, Cox et al., U.S. Patent No. 6,127,998 (Ichikawa et al.), U.S. Patent No. 6,035,013 (Orva et al.), and U.S. Patent No. 5,912,943 (Schick et al.).

Applicants submit that amended independent Claims 1, 16, and 51, together with the corresponding dependent claims, are patentably distinct from the cited prior art at least for the following reasons.

Applicants will first address the Section 102(b) rejections of Claims 1 and 51 based on Fossum.

Claim 1 requires an image pickup apparatus including a plurality of image pickup elements, each of which is formed on a single semiconductor substrate. Each of the plurality of image pickup elements includes a plurality of pixels and a scan circuit which supplies a common read-out pulse sequentially to a plurality of pixels arranged in a first direction. The plurality of pixels include photoelectric conversion units respectively and are arranged two-dimensionally. The scan circuit is arranged between photoelectric conversion units included in a single image pickup element. The scan circuit is not arranged between photoelectric conversion units arranged respectively at end potions of image pickup elements adjacent to each other. And, a width of a space between the photoelectric conversion units between which the scan circuit is arranged is shorter than a pitch of each of the pixels. Such an arrangement provides an optimal circuit layout and overcomes the conventional problems discussed at page 2, line 20, to page 4, line 15 of the specification.

One important feature of Claim 1 is that a width of a space between the photoelectric conversion units between which the scan circuit is arranged is shorter than a pitch of each of the pixels. Support for this feature can be found at least in reference to Figure 25 which defines a pixel pitch, and Figure 9, which shows a distance between one-pixel circuits 602, between which the vertical shift register 501B is arranged. (The scope

of Claim 1 is not limited to the details of this embodiment, which is referred to only for purposes of illustration).

In contrast to this feature of Claim 1, Fossum discloses drivers 300, 302, which are referred to in the Office Action as being a scan circuit, that take up the space of *two* pixels. (See page 3, lines 2-4, page 4, lines 12-14, page 4, lines 21-23, and Figures 1 and 3 of Fossum). In other words, Applicants understand Fossum to disclose a scan circuit located between photoelectric conversion units separated by at least two pixel pitches, not less than one pixel pitch, as required by Claim 1. Accordingly, Applicants submit that nothing in Fossum would teach or suggest to a person having ordinary skill in the relevant art that a width of a space between the photoelectric conversion units between which the scan circuit is arranged is shorter than a pitch of each of the pixels, as recited in Claim 1.

Based at least on this reason, Claim 1 is believed patentable over Fossum, and withdrawal of the corresponding Section 102(b) rejection is respectfully requested.

Independent Claim 51 includes the same feature just discussed in regard to Claim 1 and is believed to be patentable for at least the same reason. Accordingly, Applicants respectfully request withdrawal of the Section 102(b) rejection of Claim 51.

Applicants will now address the Section 102(b) rejection of Claim 16 based on Cox et al.

Claim 16 requires, among other things, that each of the plurality of image pickup elements includes a plurality of first common output lines each provided to a column of photoelectric conversion units, and a plurality of transfer switches which transfer signals from the plurality of first common output lines sequentially to a second common output line, wherein each of the plurality of transfer switches is arranged between

photoelectric conversion units included in a single image pickup element. Support for this feature can be found at least in reference to the vertical output lines 505 and driving column selection switches 506. Both the vertical output lines 505 and driving column selection switches 506 are shown in Figure 7 and described at page 12, lines 17-23 of the specification. Driving column selection switches 506 are also shown in Figure 9. (As with Claim 1, Claim 16 is not limited to the details of this embodiment, which is referred to only for purposes of illustration.)

In rejecting Claim 16, the Office Action refers to the switches 420 shown in Figure 3 of Cox et al. However, Applicants understand that each of the switches 420 are disclosed to be connected to a single pixel, that is, each switch is understood to output a signal from a single pixel. (See column 6, lines 4-8.) In contrast, the invention recited in Claim 16 requires that the switches be connected, via first common output lines, to a row of photoelectric conversion units. It is with this arrangement that each of the plurality of transfer switches is arranged between photoelectric conversion units included in a single image pickup element. Accordingly, Applicants submit that nothing in Cox et al. would teach or suggest to a person having ordinary skill in the relevant art that each of the plurality of image pickup elements includes a plurality of first common output lines each provided to a column of photoelectric conversion units, and a plurality of transfer switches which transfer signals from the plurality of first common output lines sequentially to a second common output line, wherein each of the plurality of transfer switches is arranged between photoelectric conversion units included in a single image pickup element, as recited in Claim 16.

Based at least on this reason, Claim 16 is believed to be patentable over Cox et al., and withdrawal of the corresponding Section 102(b) is respectfully requested.

A review of the other art of record has failed to reveal anything that, in Applicants' opinion, would remedy the deficiencies of the art discussed above, as applied against independent Claims 1, 16, and 51. Therefore, those claims are respectfully submitted to be patentable over the art of record.

The other rejected claims in this application depend from one or another of the independent claims discussed above and, therefore, are submitted to be patentable for at least the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration of the patentability of each claim on its own merits is respectfully requested.

In regard to the newly added claims, independent Claim 66 requires, inter alia, a scan circuit that includes first and second partial scanning circuits, wherein the first and second partial scanning circuits are each arranged between photoelectric conversion units arranged in the vertical direction included in a single image pickup element, and between photoelectric conversion units arranged in the horizontal direction included in the single image pickup element, and are not arranged between photoelectric conversion units arranged respectively at end portions of image pickup elements adjacent to each other. Support for this feature can be found in the specification at least at page 21, lines 10-23, which is described in reference to Figure 16. Figure 16 shows blocks of a vertical shift register 501D surrounded by one-pixel circuits 602 in both horizontal and vertical directions. (It is to be understood, of course, that the scope of Claim 66 is not limited to the details of this embodiment, which is referred to solely for purposes of illustration.)

Newly added independent Claim 68 requires, among other things, a scan circuit including a shift register of a static type, that is arranged between photoelectric conversion units included in a single image pickup element, and is not arranged between photoelectric conversion units arranged respectively at end portions of image pickup elements adjacent to each other. Support for this feature can be found at least at page 14, lines 24-25. (As with Claim 66, the scope of Claim 68 is not limited to the details of this embodiment, which is referred to solely for purposes of illustration).

The features recited in independent Claim 66 and 68 are not believed to be taught or suggested by the art of record and their allowance is respectfully requested.

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and the allowance of the present application.

Applicants' undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

Attorney for Applicants

Registration No. 24613

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-3801
Facsimile: (212) 218-2200

NY_MAIN 342182v1